discharging a flow of elastomer composite from the discharge end of the coagulum reactor, the macro-dispersion D(%) of the particulate filler in the elastomer composite being no more than 0.2% undispersed area.

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REMARKS

Claims 1 - 113 are pending in the application, of which claims 31 - 39 had stood withdrawn from consideration pursuant to a Restriction Requirement. Claims 1 - 30 and 60 - 113 stand rejected. Applicants seek to cancel claims 1 - 59 by the foregoing amendments and to amend a number of the remaining claims in accordance with an Examiner Interview (copy provided as Attachment A to this paper) kindly granted by Examiner Michl to the undersigned and one of the inventors, Bin Chung, on March 25, 1999. In view of the foregoing amendments and the following remarks, applicants believe that this application is now in condition for allowance.

Examiner Interview. Co-inventor Bin Chung and Applicants' undersigned attorney, Peter McDermott, wish to thank Examiner Michl for the Examiner Interview kindly granted at the Patent Office on March 25, 1999, and for the courtesy, cooperation and creativity shown by Examiner Michl during the interview. During the interview, Applicants discussed with Examiner Michl the significant differences between the present invention and the teachings of the art of record.

Specifically discussed was that the prior known methods of mixing carbon black or other particulate fillers into elastomers such as natural rubber, etc., simply never

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recognize the possibility of the present invention, that is, of coagulating an elastomer latex by the very act of feeding a particulate filler under sufficiently extreme speed/pressure to a continuous flow of the elastomer latex. The prior art necessarily also failed, therefore, to achieve the present invention's extraordinarily good macro-dispersion of the particulate filler in the elastomer latex. This surprising ability to achieve extraordinarily good macro-dispersion is a highly significant advantage of the present invention, discussed at length in the specification. Macro-dispersion is defined, for example, at page 5 in the Background portion of the application along with a discussion of its importance to the physical properties of the elastomer composite. (See, e.g., page 4, lines 16 - 24; see also page 10 in the Summary, lines 4 - 13; see also Figs. 9 - 25 of the application, showing the macro-dispersion and other properties of preferred elastomer composites of the invention; see also Table 10 on page 56 comparing the macro-dispersion value less than 0.2% for Example C of the invention vs. the macro-dispersion values of 1.48 and 2.82 for control Examples D and E, respectively; see also the macro-dispersion values shown for hundreds of control examples in Tables 15 - 23 (B) on pages 62 - 66, none of which is as low as the 0.2% or lower value of the present invention.

As set out in the Interview Summary (copy provided as Attachment A to this paper), Examiner Michl agreed to allow the claims of the application which recite a numerical value for the macro-dispersion, such as 0.2% or 0.3% as in claim 64 and 70. Applicant agreed to present arguments for the patentability of other claims. By the foregoing amendments, as discussed below in more detail, claims 1 - 59 are cancelled and all of the claims remaining in the application have numerical values for macro-dispersion.

Accordingly, all claims remaining in the application should now be in condition for allowance.

Allowability of the Claims.

Method claims 1 - 59 are cancelled above.

Independent elastomer composite claims 60 - 63 and 113 each is amended above to expressly recite the "macro-dispersion (D%) of the particulate filler in the elastomer composite being no more than 0.2% undispersed area." (Quoted from claim 60; claims 61 - 63 recite the same or corresponding language.) Thus, in accordance with the understanding reached with Examiner Michl during the Examiner Interview, each of these claims should now be in condition for allowance.

Independent claims 64, 67, 70, 72, 97 and 98 each already recites the macro-dispersion value. Accordingly, these claims and their dependent claims, that is, claim 64 - 77, are in condition for allowance, as recognized by Examiner Michl in the Interview Summary.

Claims 78 - 96 also recite numerical values for macro-dispersion of the claimed elastomer composites. These claims each defines an elastomer composite comprising carbon black dispersed in natural rubber.[1] Claim 78 defines the carbon black as having

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[1]Claims 94 and 95 require carbon black and silica. Claims 96 requires silica-treated carbon black.

structure and surface area properties of Region I of Fig. 8. The macro-dispersion value is called out as a function of the molecular weight of the sol portion of the rubber. More specifically, the numerical value of the macro-dispersion is defined by referring to line 101 in the graph shown in Fig. 10 of the application. Thus, the numerical value for macro-dispersion is incorporated by reference in claim 78.[2] Similarly, claim 79 is directed to carbon black having structure and surface area properties within Region II of Fig. 8 and the macro-dispersion (D%) numerical value is defined by reference to line 111 in the graph shown in Fig. 11 of the application. Similarly, claim 80 is directed to elastomer composite wherein the carbon black is in Region III of Fig. 8, and the macro-dispersion (D%) value is defined by line 121 in the graph shown in Fig. 12. Thus, each of claim 78 - 80 defines the numerical value for macro-dispersion in the claimed elastomer composite. Accordingly, the claims should be found allowable.

Claims 81 - 96 also call out numerical values for macro-dispersion in the claimed elastomer composites. Claims 81 - 84 are directed to elastomer composites having certain defined carbon blacks. The macro-dispersion values are called out as a function of the MW_{sol}, the molecular weight of the sol portion of the rubber. Claim 81

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[2]The significance of defining the macro-dispersion of the particulate filler as a function of MW_{sol} can be understood from the extensive discussion in the present specification, that prior known methods of dispersing carbon black or other particulate filler degraded (i.e., reduced) the molecular weight of the rubber. Thus, the present invention's ability to achieve extraordinary macro-dispersion even while preserving high molecular weight of the rubber is a stunning advantage of the present invention. Also, the finer carbon blacks, such as those of Region I in Fig. 8, because they are so much harder to disperse, traditionally yield elastomer composites of more degraded MW_{sol}. The present invention achieves correspondingly better results even with these finer carbon blacks.

corresponds to the elastomer composites of the invention shown in Fig. 9, and the equation in claim 81 defining the macro-dispersion numerical values is discussed in the specification on Page 82.[3] Similarly, claim 82 defines elastomer composites using carbon black of Region I in Fig. 8. The elastomer composites of claim 82 are shown in Fig. 10 and the equations defining their macro-dispersion in claim 82 are discussed at pages 83 - 84 of the specification. Similarly, claim 83 is directed to elastomer composites shown in Fig. 11, using Region II carbon blacks, and the equation defining the numerical value for macro-dispersion is discussed in the specification at page 85. Similarly, claim 84 is directed to elastomer composites shown in Fig. 12, using carbon blacks of Region III, and the macro-dispersion equations is discussed at page 87. Accordingly, claims 81 - 84 should be found allowable.

Claims 85 - 96 define elastomer composites, each employing a specified carbon black (claims 85 - 93) or a blend of carbon black and silica (claim 94 - 95) or silicon-treated carbon black (claim 96). Each defines a numerical value for the macro-dispersion of the claimed elastomer composite. Specifically, each defines the macro-dispersion as a function of MW_{sol} corresponding to the manner of claim 78 - 84, as discussed above. Accordingly, each of these claims should be found allowable.

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[3]The equation defining numerical value for macro-dispersion in claims 81 - 96 is a two-part equation corresponding to the angled boundary line seen in the corresponding graphs of the application.

Claims 99 - 111 each recites a numerical value for macro-dispersion through dependency from claims 60 - 98. Accordingly, each of these claims should be found allowable.

Claims 112 defines a vulcanizate having a crack growth rate of no more than a certain numerical value, specifically "no more than about 1.20 cm/million cycles." During the Interview, the Examiner suggested Applicants cancel claim 112. Applicants are prepared to do so if Examiner Michl believes that claim 112, as amended is still not allowable. However, Applicants have amended claim 112 above to recite now not only the crack growth rate but also a numerical value for macro-dispersion. Specifically, claim 112 is now further defined as comprising particulate filler finally dispersed in elastomer, with the aforesaid crack growth rate and macro-dispersion "no more than 0.2% undispersed area." Accordingly, Applicants request that claim 112 also be found allowable. In the event claim 112 is not found allowable, the undersigned requests a telephone call to discuss cancellation of claim 112 by Examiner's Amendment.

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Applicants submit herewith a Supplemental Information Disclosure Statement listing citations recently identified by reviewing the files of commonly owned U.S. and foreign patent applications related to the present application or in a related technology area. The citations are believed by applicants to be merely cumulative of prior art already of record in the application. None teaches or suggests the elastomer composites of the present invention.

Conclusion

In view of the foregoing amendments and remarks, applicants submit that all the claims remaining in the application are now in condition for allowance, which action is respectfully requested.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231 on: August 16, 1999.

Peter D. McDermott 8/16/99 *Date*